AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1.-56. (canceled)

57. (currently amended) An apparatus for obtaining positional information relating to an object, the apparatus comprising:

a transmitter for transmitting a probe signal towards the object, said transmitter comprising a transmitting element;

a receiver for receiving, at a plurality of spaced apart locations, the probe signal as returned by the object, said receiver comprising a plurality of receiving elements forming an antenna array; and

a detector, coupled to the receiver, for detecting the timing of the returned probe signals as received at one of the plurality of spaced apart locations and the timing of the returned probe signals as received at one or more other of the plurality of spaced apart locations, and measuring the relative timing between the detected timings;

wherein angular position information for the object can be determined from said measured relative timing; and

the apparatus further comprises

a gate input associated with each receiving element for passing signals from the receiving element to the detector, and

a common timing signal generator for generating a common timing signal to activate the gate inputs to pass the signals to the detector, and

the transmitting element and receiving elements are disposed within a single housing or on a common substrate and the receiving elements are spaced apart by distances that are the same order of magnitude as the wavelength λ of radiation that the apparatus is intended to transmit and receive.

58. (previously presented) The apparatus according to Claim 57, wherein the apparatus is adapted to be contained within a single housing.

59. (previously presented) The apparatus according to Claim 57, further comprising a processor, the processor and the antenna array being constructed as a single assembly.

60. (previously presented) The apparatus according to Claim 59, wherein the processor operates to provide all functional electrical signals to and receive all functional electrical signals from the array.

61. (previously presented) The apparatus according to Claim 57, wherein the receiver includes at least three receiving elements arranged non-collinearly.

62. (previously presented) The apparatus according to Claim 61, wherein the at least three receiving elements are arranged such that there is no axis about which the array is symmetrical.

63. (previously presented) An apparatus for obtaining positional information relating to an object, the apparatus comprising:

a transmitter for transmitting a probe signal towards the object, said transmitter comprising a transmitting element;

a receiver for receiving, at a plurality of spaced apart locations, the probe signal as returned by the object, said receiver comprising at least three receiving elements forming an antenna array; and

a detector, coupled to the receiver, for detecting the relative timing of the returned probe signals as received at the plurality of spaced apart locations;

wherein the positional information for the object can be determined from said relative timing; and

said at least three receiving elements are arranged non-collinearly and such that there is no axis about which the array is symmetrical even if the axis passes through one or more of the at least three receiving elements.

64. (previously presented) The apparatus according to Claim 57, wherein the receiving elements are arranged such that there are two unequally

spaced pairs of receiving elements which have dissimilar artefacts in their sensitivity patterns.

65. (previously presented) The apparatus according to Claim 57, including four receiving elements arranged non-collinearly.

66. (previously presented) The apparatus according to Claim 57, wherein the receiving elements are substantially the same.

67. (previously presented) The apparatus according to Claim 57, wherein the transmitting element and receiving elements have substantially the same field of view.

68. (previously presented) The apparatus according to Claim 57, wherein the spacing of two pairs of the receiving elements in a common direction is unequal.

69. (previously presented) An apparatus for obtaining positional information relating to an object, the apparatus comprising:

a transmitter for transmitting a probe signal towards the object, said transmitter comprising a transmitting element;

a receiver for receiving, at a plurality of spaced apart locations, the probe signal as returned by the object, said receiver comprising a plurality of receiving elements forming an antenna array; and

a detector, coupled to the receiver, for detecting the timing of the returned probe signals as received at one of the plurality of spaced apart locations relative to the timing of the returned probe signals as received at one or more other of the plurality of spaced apart locations;

wherein angular position information for the object can be determined from said relative timing;

the transmitting element and receiving elements are disposed within a single housing or on a common substrate and the receiving elements are spaced apart by distances that are the same order of magnitude as the wavelength λ of radiation that the apparatus is intended to transmit and receive; and

the ratio of the spacing of one pair of the receiving elements to the spacing of another pair of the receiving elements is between 0.5 and 1.

70. (previously presented) The apparatus according to Claim 57, wherein the receiving elements are arranged substantially at the vertices of a trapezial locus.

71. (previously presented) An apparatus for obtaining positional information relating to an object, the apparatus comprising:

a transmitter for transmitting a probe signal towards the object, said transmitter comprising a transmitting element;

a receiver for receiving, at a plurality of spaced apart locations, the probe signal as returned by the object, said receiver comprising a plurality of receiving elements forming an antenna array; and

a detector, coupled to the receiver, for detecting the timing of the returned probe signals as received at one of the plurality of spaced apart locations relative to the timing of the returned probe signals as received at one or more other of the plurality of spaced apart locations;

wherein angular position information for the object can be determined from said relative timing;

the transmitting element and receiving elements are disposed within a single housing or on a common substrate and the receiving elements are spaced apart by distances that are the same order of magnitude as the wavelength λ of radiation that the apparatus is intended to transmit and receive;

the receiving elements are arranged substantially at the vertices of a trapezial locus; and

the trapezial locus has long and short parallel sides, the length of the shorter side being approximately the wavelength λ of radiation that the array is intended to transmit and receive, and the length of the longer side is approximately $3\lambda/2$.

72. (previously presented) An apparatus for obtaining positional information relating to an object, the apparatus comprising:

a transmitter for transmitting a probe signal towards the object, said transmitter comprising a transmitting element;

a receiver for receiving, at a plurality of spaced apart locations, the probe signal as returned by the object, said receiver comprising a plurality of receiving elements forming an antenna array; and

a detector, coupled to the receiver, for detecting the relative timing of the returned probe signals as received at the plurality of spaced apart locations;

wherein the positional information for the object can be determined from said relative timing; and

the receiving elements are arranged substantially at the vertices of a trapezial locus having long and short parallel sides, the length of the shorter side being approximately the wavelength λ of radiation that the array is intended to transmit and receive, and the length of the longer side is approximately $3\lambda/2$.

73. (previously presented) The apparatus according to Claim 70, wherein the trapezial locus is rectangular.

74. (previously presented) The apparatus according to Claim 70, wherein the trapezial locus is non-rectangular.

75. (previously presented) An apparatus for obtaining positional information relating to an object, the apparatus comprising:

a transmitter for transmitting a probe signal towards the object, said transmitter comprising a transmitting element;

a receiver for receiving, at a plurality of spaced apart locations, the probe signal as returned by the object, said receiver comprising a plurality of receiving elements forming an antenna array; and

a detector, coupled to the receiver, for detecting the timing of the returned probe signals as received at one of the plurality of spaced apart locations relative to the timing of the returned probe signals as received at one or more other of the plurality of spaced apart locations;

wherein angular position information for the object can be determined from said relative timing; and

the transmitting element and receiving elements are disposed within a single housing or on a common substrate and the receiving elements are spaced apart by distances that are the same order of magnitude as the wavelength λ of radiation that the apparatus is intended to transmit and receive;

the receiving elements are arranged substantially at the vertices of a trapezial locus; and

the trapezial locus has two opposing angles which are substantially right angles and two opposing angles which are not right angles.

76. (previously presented) An apparatus for obtaining positional information relating to an object, the apparatus comprising:

a transmitter for transmitting a probe signal towards the object, said transmitter comprising a transmitting element;

a receiver for receiving, at a plurality of spaced apart locations, the probe signal as returned by the object, said receiver comprising a plurality of receiving elements forming an antenna array; and

a detector, coupled to the receiver, for detecting the timing of the returned probe signals as received at one of the plurality of spaced apart locations relative to the timing of the returned probe signals as received at one or more other of the plurality of spaced apart locations;

wherein angular position information for the object can be determined from said relative timing;

the transmitting element and receiving elements are disposed within a single housing or on a common substrate and the receiving elements are spaced apart by distances that are the same order of magnitude as the wavelength λ of radiation that the apparatus is intended to transmit and receive;

the receiving elements are arranged substantially at the vertices of a trapezial locus; and

the trapezial locus has long and short parallel sides.

77. (previously presented) The apparatus according to Claim 76, wherein the short side is between 0.5 and 1 times the length of the long side.

78. (previously presented) An apparatus for obtaining positional information relating to an object, the apparatus comprising:

a transmitter for transmitting a probe signal towards the object, said transmitter comprising a transmitting element;

a receiver for receiving, at a plurality of spaced apart locations, the probe signal as returned by the object, said receiver comprising a plurality of receiving elements forming an antenna array; and

a detector, coupled to the receiver, for detecting the relative timing of the returned probe signals as received at the plurality of spaced apart locations;

wherein the positional information for the object can be determined from said relative timing; and

the receiving elements are arranged substantially at the vertices of a trapezial locus having long and short parallel sides, the short side being between 0.5 and 1.0 times the length of the long side.

79. (previously presented) The apparatus according to Claim 78, wherein the receiving elements are spaced apart by distances that are the same order of magnitude as the wavelength λ of radiation that the apparatus is intended to transmit and receive.

80. (previously presented) An apparatus for obtaining positional information relating to an object, the apparatus comprising:

a transmitter for transmitting a probe signal towards the object, said transmitter comprising a transmitting element;

a receiver for receiving, at a plurality of spaced apart locations, the probe signal as returned by the object, said receiver comprising a plurality of receiving elements forming an antenna array, said receiving elements being arranged such that there is a first pair of the receiving elements and a second pair of the receiving elements, the spacing of the elements in the first pair and in the second pair being unequal and the first and second pairs having dissimilar artefacts in their sensitivity patterns; and

a detector, coupled to the receiver, for detecting the relative timing of the returned probe signals as received at the first pair of the receiving elements, and for detecting the relative timing of the returned probe signals as received at the second pair of the receiving elements;

wherein said positional information for the object can be determined from said relative timing of the returned probe signals as received at the first pair of the receiving elements, and from said relative timing of the returned probe signals as received at the second pair of the receiving elements.

81. (previously presented) The apparatus according to Claim 80, wherein the receiving elements are arranged at the vertices of a trapezial locus and the first pair and the second pair are parallel.

82. (previously presented) The apparatus according to Claim 80, wherein the spacing between the elements of the first pair is approximately equal to a characteristic wavelength λ of the signal, and the spacing between the elements of the second pair is approximately equal to $3\lambda/4$.

83. (previously presented) The apparatus according to Claim 80, wherein the ratio of the spacing of the receiving elements in the first pair to the spacing of the receiving elements in the second pair is within at least one of the ranges 0.5 to 1.0 and 0.75 to 0.9.

84. (previously presented) The apparatus according to Claim 57, wherein the receiving elements are arranged substantially at the vertices of a right-angled triangular locus.

85. (previously presented) The apparatus according to Claim 57, wherein the receiving elements are spaced apart by a distance $\mathbf{m}\lambda$ where **m** is less than one of 10, 8, 5, 3, and 2, and **m** is greater than one of 0.1, 0.2, 0.3, and 0.5.

86. (previously presented) The apparatus according to Claim 57, wherein the receiving elements are spaced apart by distances between at least one of: 1cm and 10cm; and 3cm and 8cm.

87. (previously presented) The apparatus according to Claim 57, wherein the antenna array has a peripheral size of approximately 10 cm x 12 cm.

88. (previously presented) The apparatus according to Claim 57, further comprising a processing stage operable to detect the interval between a signal being received by a first set of any two or more of the receiving elements and to determine a first angular position of an object from which the transmitted signal has been reflected; and to determine the interval between a signal being received by a second set of any two or more of the receiving elements and to determine a second angular position of an object from which the transmitted signal has been reflected.

89. (previously presented) The apparatus according to Claim 57, wherein the detector comprises switched sampling stages triggered from a common signal distributed via delay lines.

90. (previously presented) The apparatus according to Claim 57, wherein the frequency of the transmitted signal is within one of the range 0.5 and 77 GHz and the range 2 and 25 GHz.

91. (previously presented) The apparatus according to Claim 90, wherein the frequency of the transmitted signal is one of approximately 0.5GHz, 1GHz, 6 GHz, 10 GHz, and 2 to 2.5 GHz.

92. (previously presented) The apparatus according to Claim 90, wherein the frequency of the transmitted signal is 2.45 GHz.

93. (previously presented) The apparatus according to Claim 57, further comprising a processing stage operable to compare the signals derived from two of the receiving elements and to determine the time difference at which the signals appear most similar.

94. (previously presented) The apparatus according to Claim 57, further comprising a processor adapted to apply a cross-correlation process to the returned probe signals.

95. (previously presented) The apparatus according to Claim 94, wherein the cross-correlation process is a truncated cross-correlation process.

96. (previously presented) The apparatus according to Claim 94, wherein the cross-correlation process is applied after a sampling process.

97. (previously presented) The apparatus according to Claim 57, further comprising a processing stage operable by application of a truncated cross correlation function to detect the interval between signals received by a plurality of the receiving elements, whereby to determine an angular position of an object from which the transmitted signal has been reflected.

98. (previously presented) The apparatus according to Claim 57, the apparatus being operative in an operating cycle for each of m steps in which $\mathbf{n} = 1, 2 .. \mathbf{m}$, and including:

a signal generating stage operative, simultaneously with or at a fixed time after a transmitting trigger instant $\mathbf{t_n}$ to generate a signal, and a transmitting element to transmit said signal into a detection field;

a plurality of spaced receiving elements operative simultaneously with or at a fixed time after a receiving trigger instant $\mathbf{r_n}$ to receive a portion of the signal reflected from one or more objects in the detection field, the interval $\mathbf{r_n - t_n}$ varying as a function of **n** and having a magnitude in a range corresponding to the times of travel of a signal reflected from an object within the detection field;

a processor adapted to identify the values of **n** at which signals reflected from one object are received at two or more receiving elements and thereby

detecting the time taken, and therefore the distance travelled, by the signals from the transmitting element to the various receiving elements;

wherein the processor is further adapted to calculate the position of the object from the various path lengths thereby identified.

99. (previously presented) An apparatus for obtaining positional information relating to an object, the apparatus comprising:

a transmitter for transmitting a probe signal towards the object, said transmitter comprising a transmitting element;

a receiver for receiving, at a plurality of spaced apart locations, the probe signal as returned by the object, said receiver comprising a plurality of receiving elements forming an antenna array; and

a detector, coupled to the receiver, for detecting the timing of the returned probe signals as received at one of the plurality of spaced apart locations relative to the timing of the returned probe signals as received at one or more other of the plurality of spaced apart locations;

wherein angular position information for the object can be determined from said relative timing;

the transmitting element and receiving elements are disposed within a single housing or on a common substrate and the receiving elements are spaced apart by distances that are the same order of magnitude as the wavelength λ of radiation that the apparatus is intended to transmit and receive; and

wherein the size of each receiving element is less than one of 10λ and 4λ, and is greater than $\lambda/4$, where λ is the wavelength of radiation that the apparatus is intended to transmit and receive.

100. (previously presented) An apparatus for obtaining positional information relating to an object, the apparatus comprising:

a transmitter for transmitting a probe signal towards the object, said transmitter comprising a transmitting element;

a receiver for receiving, at a plurality of spaced apart locations, the probe signal as returned by the object, said receiver comprising a plurality of receiving elements forming an antenna array; and

a detector, coupled to the receiver, for detecting the timing of the returned probe signals as received at one of the plurality of spaced apart locations relative to the timing of the returned probe signals as received at one or more other of the plurality of spaced apart locations;

wherein angular position information for the object can be determined from said relative timing;

the transmitting element and receiving elements are disposed within a single housing or on a common substrate and the receiving elements are spaced apart by distances that are the same order of magnitude as the wavelength λ of radiation that the apparatus is intended to transmit and receive; and

wherein the size of the transmitting element is less than one of 10λ and 4λ, and is greater than $\lambda/4$, where λ is the wavelength of radiation that the apparatus is intended to transmit and receive.

101. (previously presented) The apparatus according to Claim 57, wherein the positional information includes at least one of the range, azimuth and elevation of the object.

102. (previously presented) The apparatus according to Claim 57, further comprising:

a warning zone definition stage for defining a warning zone within a detection field of the apparatus; and

a discrimination stage for determining whether a detected object is within the warning zone;

in which the warning zone is defined as a three-dimensional region within the detection field,

wherein the warning zone is contained within and is smaller than the detection field of the apparatus.

103. (previously presented) The apparatus according to Claim 57 for use in one of a vehicle and a hand held tool.

104. (previously presented) The apparatus according to Claim 103, wherein the antenna array is adapted to be located on a fixed location on the vehicle.

105. (previously presented) The apparatus according to Claim 103, wherein the antenna array is adapted to be located within a non-metallic component of the vehicle.

106. (previously presented) The apparatus according to Claim 103, wherein the antenna array is adapted to be located within a non-metallic bumper of the vehicle.

107. (previously presented) The apparatus according to Claim 57, wherein the apparatus is adapted for use in a vehicle, is adapted to warn a driver of an object external to the vehicle, and further comprises an output stage operative to generate at least one of an audible signal and a visual signal in dependence on positional information relating to the object.

108. (previously presented) The apparatus according to Claim 57, wherein the transmitting element and the receiving elements are disposed on one side of the common substrate, and the apparatus further comprises a printed circuit board adapted to exchange electrical signals with the transmitting element and the

receiving elements, said printed circuit board including the detector and being disposed on the other side of the common substrate.

109. (previously presented) The apparatus according to Claim 57, further comprising a processor adapted to obtain information about objects within or behind a wall.

110. (previously presented) The apparatus according to Claim 57, further comprising an imaging device for providing an image of an environment in conditions that human vision is compromised.

111. (previously presented) The apparatus according to Claim 110, wherein the apparatus is operable when vision is compromised by the physiological condition of a user.

112. (previously presented) The apparatus according to Claim 110, wherein the apparatus is operable when vision is compromised by environmental conditions.

113. (previously presented) A vehicle comprising the apparatus according to Claim 57.

114. (previously presented) A hand-held tool comprising the apparatus according to Claim 57.

115. (currently amended) An apparatus for obtaining positional information relating to an object, the apparatus comprising:

means for transmitting a probe signal towards the object, said transmitting means comprising a transmitting element;

means for receiving, at a plurality of spaced apart locations, the probe signal as returned by the object, said receiving means comprising a plurality of receiving elements forming an antenna array; and

detecting means, coupled to the receiving means, for detecting the timing of the returned probe signals as received at one of the plurality of spaced apart locations and the timing of the returned probe signals as received at one or more other of the plurality of spaced apart locations, and measuring the relative timing between the detected timings;

wherein angular position information for the object can be determined from said measured relative timing; and

the apparatus further comprises

a gate means associated with each receiving element for passing signals from the receiving element to the detecting means, and

a common timing signal generating means for generating a common timing signal to activate the gate means to pass the signals to the detecting means, and

the transmitting element and receiving elements are disposed within a single housing or on a common substrate and the receiving elements are spaced apart by distances that are the same order of magnitude as the wavelength λ of radiation that the apparatus is intended to transmit and receive.

116. (previously presented) An apparatus for obtaining positional information relating to an object, the apparatus comprising:

means for transmitting a probe signal towards the object, said transmitting means comprising a transmitting element;

means for receiving, at a plurality of spaced apart locations, the probe signal as returned by the object, said receiving means comprising a plurality of receiving elements forming an antenna array, said receiving elements being arranged such that there is a first pair of the receiving elements and a second pair of the receiving elements, the spacing of the elements in the first pair and in the second pair being unequal and the first and second pairs having dissimilar artefacts in their sensitivity patterns; and

detecting means, coupled to the receiving means, for detecting the relative timing of the returned probe signals as received at the first pair of the receiving elements, and for detecting the relative timing of the returned probe signals as received at the second pair of the receiving elements;

wherein said positional information for the object can be determined from said relative timing of the returned probe signals as received at the first pair of the

receiving elements, and from said relative timing of the returned probe signals as received at the second pair of the receiving elements.